Los Alamos National Laboratory

LDRD/ER CATEGORY TEAM DESCRIPTIONS
(Revised 12/02)

As a result of a strategic review of the LANL LDRD Exploratory Research component, previous category teams have been consolidated into five broad areas. These areas reflect the broad spectrum of science and technology capabilities at LANL as well as the complex needs of the Laboratory's missions. This document presents an overview of the subject areas composing these broad categories. The five categories are:

- Chemistry & Materials Science (CMS)
- Environmental & Biological Sciences (EBS)
- Information Science & Technology (IST)
- Physics (PHYS)
- Technology (TECH)

LDRD/ER solicits proposals for clearly defined, innovative research projects that fall into one or more of these broad categories. The following brief descriptions include examples of relevant sub-disciplines; these lists should not be seen as exhaustive, nor should they be considered as exclusive.

Chemistry & Materials Science (CMS)

CMS considers proposals for original research projects with clearly defined approaches, goals, and impacts in chemistry, materials sciences, and related disciplines. Actinide materials and chemistry remain topics of high interest to the Laboratory, and novel materials synthesis and new analytical techniques are priorities. Modeling and experimental proposals aimed at fundamental understanding of basic principles of these disciplines are also sought.

Examples include:
- heterogeneous and homogeneous catalysis
- theory / modeling and simulation
- surface science/chemisorption; films and coatings; membranes and polymers
- novel chemical and materials instrumentation/synthesis/computation
- energetic, structural, electronic materials
- interdisciplinary issues (materials-biology-chemistry condensed matter, etc.)
- use of specialized approaches/facilities (spallation neutrons, high magnetic fields, beams, etc.)

Environmental & Biological Sciences (EBS)

EBS considers proposals for original research in biosciences and technology, including genomics and systems biology; biophysics and medicine; and the environmental sciences in the broadest sense. Both the physical and chemical earth and planetary sciences as well as biosystems on all scales are included in this category. The strongest emphasis will be on innovative theoretical and/or experimental research oriented toward gaining a fundamental understanding of processes and systems.

Examples include:
- biosystems, biostructures, biomechanics, bioprocesses
- geophysics, geological sciences, hydrology, soil science (on Earth as well as other planets)
- atmospheric science and oceanography
- planetary remote sensing
- environmental biology and ecology, including stewardship, restoration, remediation

Information Science & Technology (IST)

IST includes applied mathematics, statistical techniques, knowledge development and data analysis methods, and development and application of new computational tools, including hardware, systems software, and modeling and simulation tools. IST supports the Laboratory thrust to accelerate the development of the computer science competency in the broadest sense, and projects that span these disciplines to do this are of special interest.

Examples:
- applied mathematics and statistical methods
- computer architectures, system software, and software engineering
- theory of computing, formal methods, artificial intelligence
- data mining, pattern recognition, visualization
- networks, telecommunications, computer security
- numerical methods, including finite-element and finite-difference methods, mesh generation, adaptive solutions, nonlinear methods, agent-based modeling

Physics (PHY)

Los Alamos is known world-wide for its physics capabilities across the spectrum of physics sub-disciplines, from particle physics to astrophysics, and all of these are included in this category. Theoretical and experimental proposals will be evaluated on the importance of the research results as they apply to increasing fundamental understanding, and on the soundness of physics and methods proposed. The strongest emphasis will be on those projects that address the most significant problems at the forefront of their

fields. High value will be placed on proposals that are directed at fundamental understanding of physical systems or processes.

Examples:
- basic and applied molecular, optical, and plasma physics
- fluid and nonlinear mechanics
- directed energy sources (including particle beams, lasers, and microwaves)
- astronomy and astrophysics
- space sciences, including the near-Earth space environment
- atomic, nuclear, particle physics and field theory

Technology (TEC)

TEC considers proposals primarily in engineering fields, including manufacturing processes and other multi-disciplinary areas, and in the development and application of novel instruments and devices. Quality research proposals emphasizing theory and analysis, simulation and modeling, and new design methods are encouraged. Experimental and cross-disciplinary proposals are welcomed. Particular emphasis will be placed on projects aimed at proof-of-principle for high-risk technologies.

Examples:
- industrial, mechanical, civil engineering
- chemical and nuclear engineering
- instrumentation and data acquisition systems
- measurement physics
- sensor and transducer development
- signal processing and enhancement